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L9: Entry 47 of 88

File: DWPI

Jan 24, 1995

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TITLE: Alkali dry element battery with sealant structure - uses washer which has gas omission hole between gasket having thin pad and negative electrode terminal assembly

PATENT-ASSIGNEE:

ASSIGNEE

CODE

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PRIORITY-DATA: 1993JP-0158722 (June 29, 1993)

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INT-CL (IPC): H01M 2/12

ABSTRACTED-PUB-NO: JP07022013A

BASIC-ABSTRACT:

The alkali dry element battery includes the sealant structure which is formed by a washer (8). The washer has a gas emission hole (8a) between a gasket (7) made up of resin and a negative electrode terminal assembly (9). A thin pad (7a) is formed in the gasket.

The thin pad is formed in the semicircle whose coaxial radius is at right angles to the straight line which connects the main shaft of the thin pad part and battery.

ADVANTAGE - Prevents scattering of electrolyte. Improves safety and reliability. Prevents bursting of alkali dry element battery.

CHOSEN-DRAWING: Dwg.2/4

TITLE-TERMS: ALKALI DRY ELEMENT BATTERY SEAL STRUCTURE WASHER GAS OMIT HOLE
GASKET THIN PAD NEGATIVE ELECTRODE TERMINAL ASSEMBLE

DERWENT-CLASS: X16

EPI-CODES: X16-A01A; X16-F03B;

SECONDARY-ACC-NO:

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H 0 1 M 2/12

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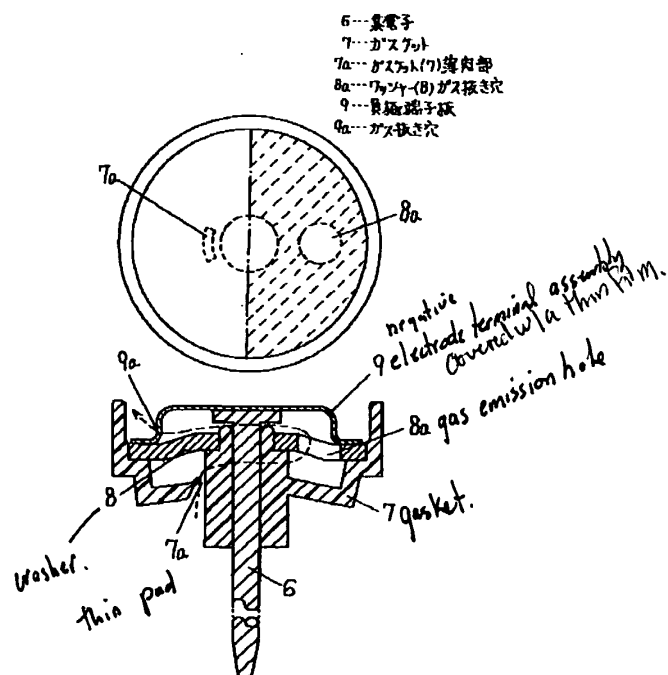
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(54) 【発明の名称】 アルカリ乾電池

(57) 【要約】

【目的】 アルカリ乾電池において、破裂防止機構作動時のガス抜き経路を改善し、同機構作動時に噴出するガスからアルカリ電解液を分離することにより、電解液の飛散を抑制することを目的とする。

【構成】 破裂防止機構として樹脂製ガスケット7の一部に薄肉部7aを形成し、この薄肉部7aに対するワッシャー8のガス抜き穴8aが前記薄肉部7aと電池の中心軸を結ぶ直線に対して直角である同軸半径により相対する半円内に形成されこれにより、ワッシャー8がガス抜き経路の電解液遮蔽板として働き、同機構作動時の電解液の飛散を抑制することができる。



【特許請求の範囲】

【請求項1】 破裂防止機構を有する樹脂製ガスケットと負極端子板との間にガス抜き穴を有するワッシャーからなる封口体で封口したアルカリ乾電池であって、破裂防止機構として樹脂製ガスケットの一部に薄肉部を形成し、この薄肉部に対するワッシャーのガス抜き穴が前記薄肉部と電池の中心軸を結ぶ直線に対して直角である同軸半径により相対する半円内に形成されたアルカリ乾電池。

【請求項2】 破裂防止機構を有する樹脂製ガスケットと負極端子板との間にガス抜き穴を有するワッシャーからなる封口体で封口したアルカリ乾電池であって、破裂防止機構としてワッシャーの一部に樹脂製ガスケットに面して刃突起を形成し、この刃突起に対するワッシャーのガス抜き穴が、前記刃突起と電池の中心軸を結ぶ直線に対して直角である同軸半径により相対する半円内に形成されたアルカリ乾電池。

【請求項3】 前記負極端子板に設けたガス抜き穴に対するワッシャーのガス抜き穴が前記負極端子板のガス抜き穴と電池の中心軸を結ぶ直線に対して直角である同軸半径により相対する半円内に形成された請求項1または請求項2に記載のアルカリ乾電池。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明はアルカリ乾電池の破裂防止機構に関し、詳しくは同機構作動時に電池からの電解液の漏出を緩和し、電解液の飛散による機器等への損傷を少なくするものである。

【0002】

【従来の技術】一般的に、アルカリ乾電池はカップ状の金属ケースに二酸化マンガンを主成分とする正極活物質と亜鉛粉末をゲル状電解液に分散させた負極活物質をセパレータによって分離配置し、樹脂製ガスケットにより封口している。電解液として用いる高濃度のアルカリ性水溶液は浸透性に富むため密封構造になっている。

【0003】亜鉛を負極活物質として用いたアルカリ乾電池においては、誤使用による充電や亜鉛の腐食反応により、電池内部にガスが発生し、電池内圧が増加して電池の破裂に至るおそれがあり、一般的には電池の内圧が上昇した場合には破裂防止機構が作動し、破裂を避ける設計がなされている。この破裂防止機構の作動原理は電池の封口部品であるガスケットの一部に機械的強度を低下させた部分を構造的に設け、電池内部の圧力が高まった際に同部分が破断し、電池内部に発生したガスを電池外へ排出することにより、電池の破裂を防いでいる。破裂防止機構にはいくつかの機構が考案されているが基本的な破裂防止方法は上記と同様の方法で電池の破裂を防止している（例えば、特開昭58-21478号公報）。

【0004】

【発明が解決しようとする課題】従来、負極端子板やワッシャー等は複数のガス抜き穴を有し、ガスケットの破裂防止用破断部は環状に成型される等、これらのガスケット破断位置と負極端子板のガス抜き用の穴およびその間の関係は、障害物を極力排し、直線的にガスが抜けるように配置され、破裂防止機構の動作のみが考慮された構造になっている。破裂防止機構作動時にもこの構造を反映して、電解液を含んだガスは負極端子板のガス抜き用の穴から勢いよく噴出し、同機構作動時には電池近傍のみならず広い範囲に電解液が飛散する。アルカリ乾電池の電解液には通常、高濃度のアルカリ性水溶液が用いられているため、電解液が付着した部位は著しく損傷する。

【0005】この問題を回避するために破裂防止機構作動時のガス排出経路に吸液体などを配し、電解液を吸収させるものも考案されているが、吸液体自体が障害物となってガスの排出を妨げ、破裂防止機構の作動を不安定にさせるおそれがある（例えば、特開昭62-128434号公報）。

【0006】本発明は破裂防止機構作動時の上記問題を解決するもので、アルカリ乾電池の同機構作動時の電解液の飛散を抑制し、電解液付着による人体や機器などの損傷を少なくすることによって、製品の安全性、信頼性を向上させることを目的とする。

【0007】

【課題を解決するための手段】一般的に、アルカリ乾電池の破裂防止機構は封口材である樹脂製ガスケットとワッシャー、電池の負極端子板である底板および集電体とからなる組立封口体中に組み込まれている。すなわち、電池内部に圧力が発生した場合、一定圧力を越えると樹脂製ガスケットの一部が破断し、電池内部のガスはガスケットの破断部から組立封口体の内部のワッシャーのガス抜き穴を通り、負極端子板のガス抜き用の穴から電池外に排出される。

【0008】本発明者等は破裂防止機構作動時の状況を調査し、電解液の飛散現象は各ガス排出穴の位置関係に依存することを突き止めた。すなわち、破裂防止機構におけるガスケットの破断部とワッシャー、およびワッシャーと負極端子板のガス抜き穴等の位置関係をガス通過経路順に隣合うものはそれぞれ少なくとも電池の中心線を軸とし90度以上回転させた位置とし、ガスの通過経路が直線的にならないような位置関係にすることにより、排出されるガスに含まれる電解液の量を減少させ、さらに電解液の飛散する範囲を縮小させることにより、電解液付着による損傷を少なくすることができることから本発明に到達した。

【0009】

【作用】電池内部に発生したガスは破裂防止機構作動時に電池外に排出されるがその際電解液を広範囲にスプレー状に噴出する。これはガスを排出させやすくするため

にガス排出経路が直線的であり、ガスとともに電解液を噴出させ易い構造になっているためである。そこで、破裂防止機構を構成している樹脂製ガスケットの破断部とワッシャーおよびワッシャーと負極端子板のガス抜き穴の間の位置関係を集電体を軸として隣合うガス抜き穴が重なり合う位置からそれぞれ少なくとも90度以上回転させたような位置関係を構成することにより遮蔽効果が得られ、ガスから電解液を分離し、電解液の噴出を緩和することができる。

【0010】したがって、本発明を用いれば誤使用などにより電池内部にガスが発生し、破裂防止機構が作動してもガスとともに噴出する電解液は広範囲に飛散する事なく、人体や機器に与える損傷を少なくすることができ、安全性と信頼性に優れた高品質のアルカリ乾電池を提供することができる。

【0011】

【実施例】以下、実施例および比較例に基づいて本発明を具体的に説明する。

【0012】本実施例1、2と比較例は図1に示すアルカリマンガン電池LR6を作成して行なった。図1において、1は電池の外装ラベル、2は正極ケース、3は二酸化マンガんに導電材として黒鉛を添加し成形した正極合剤、4はセパレータ、5は水酸化カリウムを溶解させたアルカリ電解液にゲル化剤と共に亜鉛合金粉末を分散させたゲル状亜鉛負極である。6是集電子、7は樹脂製ガスケット、8はワッシャー、9は負極端子板をなす底板である。

【0013】実施例

実施例1として一部に薄肉部7aを有する樹脂製ガスケット7を用いて、図2のように、封口体内部の各ガス抜き穴を電池内部に圧力が生じた際にガスケット7が破断する部分と負極端子板9のガス抜き穴9aの位置を最近接に配し、その間に位置するワッシャー8のガス抜き穴8aをガスケット7の破断部分および負極端子板9のガ*

*ス抜き穴9aに対し、集電子6を軸として180度回転させた位置に配した。破裂防止機構作動時には、ガスは点線で示される通路を経て電池外へと排出される組立封口体を作製して電池の封口に用いた。ワッシャー8が遮蔽物となりガスは迂回して排出され、遮蔽物によってガスから電解液が分離される。

【0014】実施例2として薄肉部のないガスケット7と1つのガス抜き穴9aを有する負極端子板9およびこれらの間に1つのガス抜き穴8aと集電子6を軸として相対する位置にガスケット7に向いて1つの刃突起8bを有するワッシャー8を用いて、図3のようにワッシャー8に設けた刃突起8bと負極端子板9のガス抜き穴9aの位置を最近接に配した。破裂防止機構作動時には、ガスは点線で示される通路を経て電池外へと排出される組立封口体を作製して電池の封口に用いた。ワッシャー8が障害物となりガスは迂回して排出され、遮蔽物によってガスから電解液が分離される。

【0015】比較例

比較例として、電池内部に圧力が生じた際に破断する薄肉部7aを集電子6の軸に対し環状に成型したガスケット7と、負極端子板9の4つのガス抜き穴9aおよびその間に位置するワッシャー8の4つのガス抜き穴8aの位置関係を図4のように最近接に配した組立封口体を作製した。この場合、ガスは点線で示される直線的な通路を経て電池外へ排出される。

【0016】このようにして、本実施例および比較例の電池をそれぞれ4個の内1個を逆装填し、10Ωの外部抵抗を用いて3個の電池で逆装填した1個の電池が充電されるように接続し、電池内部にガスを発生させ破裂防止機構が作動した際の電解液の飛散状態を試験した。その結果を(表1)に示す。

【0017】

【表1】

破裂防止機構作動時の電解液飛散試験結果

電解液の最大飛散距離	実施例1	実施例2	比較例
10cm未満	58個	46個	0個
10cm以上20cm未満	23個	29個	17個
20cm以上30cm未満	19個	25個	32個
30cm以上	0個	0個	51個
合 計	100個	100個	100個

【0018】(表1)の結果から比較例に較べ実施例は破裂防止機構作動時に飛散する電解液は電池の近傍のみで飛散範囲は狭い範囲にとどまっている。

【0019】なお実施例では、破裂防止機構としてのガスケット薄肉部、刃突起とワッシャーのガス抜き穴との※50

※間の位置関係を集電体を軸として180度回転させた構成で説明したが、この位置関係が最も好ましく、90度の位置関係迄は効果が認められた。

【0020】

【発明の効果】以上詳述したように、アルカリ乾電池の

破裂防止機構に本発明のようにガス通過経路中遮蔽物を用いれば、誤使用等により電池内部にガスが発生し破裂防止機構が作動しても、電解液の飛散は少なく、人体や機器に損傷を与えることの少ない、安全性および信頼性に優れた良品の製品を提供できる。

【図面の簡単な説明】

【図1】本発明に用いたアルカリ乾電池LR6の半断面図

【図2】実施例1に用いた封口体の断面図

【図3】実施例2に用いた封口体の断面図

【図4】比較例に用いた封口体の断面図

【符号の説明】

1 外装ラベル

2 正極ケース

3 正極合剤

4 セパレータ

5 ゲル負極

6 集電子

7 樹脂製ガスケット

7a 薄肉部

8 ワッシャー

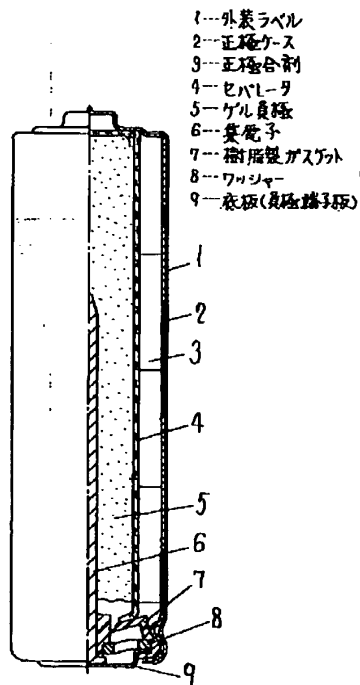
8a ガス抜き穴

10 8b 刃突起

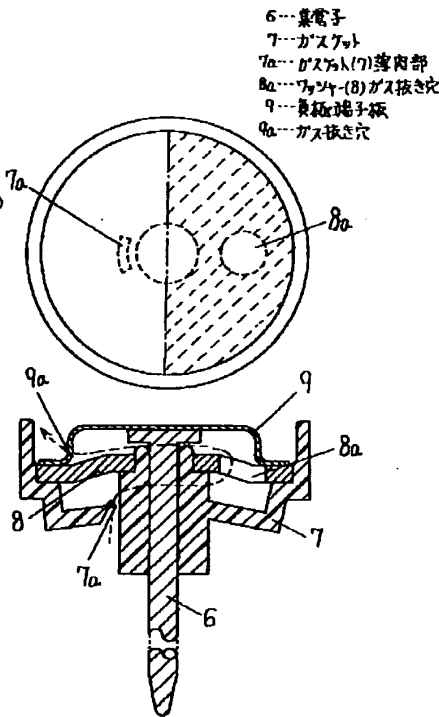
9 底板（負極端子板）

9a ガス抜き穴

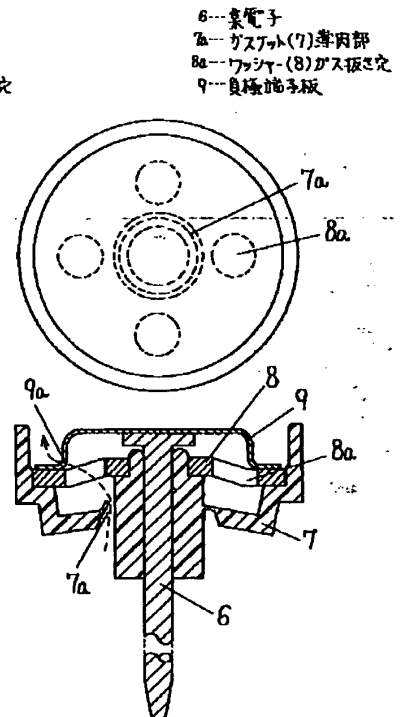
【図1】



【図2】

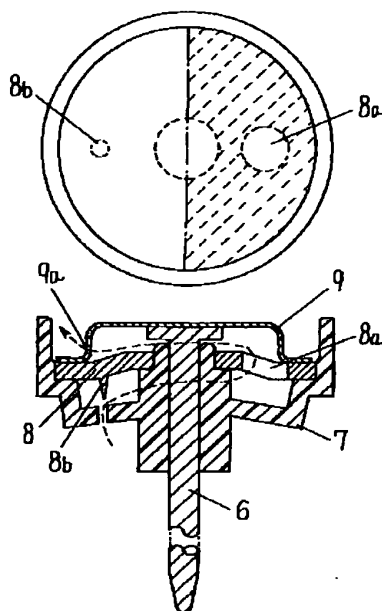


【図4】



【図3】

6---基電子
8a---ワッシャー-(8)ガス抜き穴
8b---ワッシャー-(8)貫通孔



PATENT ABSTRACTS OF JAPAN

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(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

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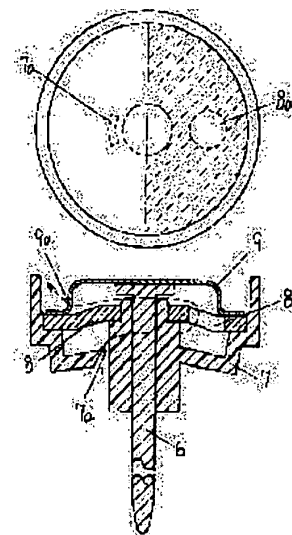
(72)Inventor : TANAKA KEISUKE
OKUBO KAZUTOSHI
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(54) ALKALINE DRY CELL

(57)Abstract:

PURPOSE: To restrain an electrolyte from scattering by improving a vent path when a burst preventing mechanism is operative, and separating an alkaline electrolyte from gas blown out when the mechanism is operative in an alkaline dry cell.

CONSTITUTION: A thin portion 7a as a burst preventing mechanism is formed in a part of a gasket 7 made of a resin. A vent hole 8a of a washer 8 with respect to the thin portion 7a is formed inside a semicircle relative to a coaxial radius perpendicular to a line connecting the thin portion 7a to the axis of a battery. Consequently, the washer 8 functions as an electrolyte shielding plate for a vent path so as to restrain scattering of an electrolyte when the mechanism is operative.



LEGAL STATUS

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[Date of final disposal for application]

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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] About the rupture prevention mechanism of an alkaline battery, in detail, this invention eases exsorption of the electrolytic solution from a cell at the time of this mechanism operation, and lessens the injury to the device by scattering of the electrolytic solution etc.

[0002]

[Description of the Prior Art] Generally, the alkaline battery carried out separation arrangement of the positive active material which makes manganese dioxide a principal component at a cup-like metal case, and the negative-electrode active material which distributed zinc powder to the gel electrolytic solution with separator, and has obturated it with the gasket made of a resin. Since the high-concentration alkaline solution used as the electrolytic solution is rich in permeability, it has seal structure.

[0003] In the alkaline battery using zinc as a negative-electrode active material, there is a possibility of gas occurring inside a cell, and cell internal pressure increasing, and resulting in rupture of a cell by the corrosion reaction of charge by misuse or zinc, when the internal pressure of a cell generally rises, a rupture prevention mechanism operates, and the design which avoids rupture is made. The working principle of this rupture prevention mechanism has prevented rupture of a cell by the amount of said division's fracturing, when the portion into which the mechanical strength was reduced is structurally prepared in some gaskets which are the obturation parts of a cell and the pressure inside a cell increases in it, and discharging the gas which occurred inside the cell out of a cell. Although some mechanisms are devised by the rupture prevention mechanism, the fundamental rupture prevention method has prevented rupture of a cell by the same method as the above (for example, JP,58-21478,A).

[0004]

[Problem(s) to be Solved by the Invention] Conventionally, the hole for degassing of these gasket fracture positions and a negative-electrode terminal assembly -- a negative-electrode terminal assembly, a washer, etc. have two or more vent holes, and the fracture section for rupture prevention of a gasket is cast annularly -- and a relation in the meantime eliminate an obstruction as much as possible, they are arranged so that gas may fall out linearly, and they have the structure where only operation of a rupture prevention mechanism was taken into consideration. The gas by which the electrolytic solution was included reflecting this structure also at the time of a rupture prevention mechanism operation blows off with sufficient vigor from the hole for degassing of a negative-electrode terminal assembly, and the electrolytic solution disperses not only near the cell but in the latus range at the time of this mechanism operation. Since high-concentration alkaline solution is usually used for the electrolytic solution of an alkaline battery, the part to which the electrolytic solution adhered is damaged remarkably.

[0005] Although the thing which ***** etc. is allotted [thing] to the gas eccrisis path at the time of a rupture prevention mechanism operation, and makes the electrolytic solution absorb is also devised in order to avoid this problem, the ***** itself serves as an obstruction, eccrisis of gas is barred, and there is a possibility of making the operation of a rupture prevention mechanism unstable (for example, JP,62-128434,A).

[0006] It aims at raising the safety of a product, and reliability by this invention's solving the above-mentioned problem at the time of a rupture prevention mechanism operation, suppressing scattering of the electrolytic solution at the time of this mechanism operation of an alkaline battery, and lessening the injury on the human body by electrolytic-solution adhesion, a device, etc.

[0007]

[Means for Solving the Problem] the assembly obturation which the rupture prevention mechanism of an alkaline battery generally becomes from the bottom plate and charge collector which are the gasket made of a resin which is obturation material, a washer, and the negative-electrode terminal assembly of a cell -- it is included in the inside of the body That is, when a pressure occurs inside a cell, if a constant pressure is exceeded, some gaskets made of a resin will fracture, and the gas inside a cell passes along the vent hole of the washer inside an assembly obturation object from the fracture section of a gasket, and is discharged out of a cell from the hole for degassing of a negative-electrode terminal assembly.

[0008] this invention person etc. investigated the situation at the time of a rupture prevention mechanism operation, and it traced depending for the scattering phenomenon of the electrolytic solution on each gas eccrisis hole site relation. Namely, the fracture section and the washer of a gasket in a rupture prevention mechanism, And a ***** thing makes physical relationship, such as a vent hole of a washer and a negative-electrode terminal assembly, the position rotated 90 degrees or

more centering on the center line of a cell at least at the order of a gas passage path, respectively. By making it physical relationship to which the passage path of gas does not become linear, by decreasing the amount of the electrolytic solution contained in the gas discharged, and making the range in which the electrolytic solution disperses further reduce, since the injury by electrolytic-solution adhesion was lessened, this invention was reached.

[0009]

[Function] Although the gas which occurred inside the cell is discharged out of a cell at the time of a rupture prevention mechanism operation, it spouts the electrolytic solution in the shape of a spray broadly in that case. In order to carry out that it is easy to make gas discharge, this has a linear gas ejection path and is because it has the structure of being easy to make the electrolytic solution blowing off with gas. Then, by constituting physical relationship which rotated the physical relationship between the fracture section of the gasket made of a resin, washer and washer which constitute the rupture prevention mechanism, and the vent hole of a negative-electrode terminal assembly at least 90 degrees or more, respectively from the position where ~~*****~~ vent holes overlap centering on a charge collector, a shielding effect can be obtained, the electrolytic solution can be separated from gas, and jet of the electrolytic solution can be eased.

[0010] Therefore, the quality alkaline battery which could lessen the injury done to a human body or a device, without the electrolytic solution spouted in gas even if gas will occur inside a cell by misuse etc. if this invention is used, and a rupture prevention mechanism operates dispersing broadly, and was excellent in safety and reliability can be offered.

[0011]

[Example] Hereafter, based on an example and the example of comparison, this invention is explained concretely.

[0012] This examples 1 and 2 and the example of comparison created the alkaline manganese dioxide cell LR6 shown in drawing 1, and performed it. the positive electrode which the sheathing label of a cell and 2 added the positive-electrode case to manganese dioxide, 3 added the graphite as electric conduction material, and 1 fabricated in drawing 1 -- it is the gel zinc negative electrode which made the alkali electrolytic solution in which a mixture and 4 dissolved separator and 5 dissolved the potassium hydroxide distribute zinc-alloy powder with a gelling agent As for 6, a current collector and 7 are bottom plates to which the gasket made of a resin and 8 make a washer, and 9 makes a negative-electrode terminal assembly.

[0013] The gasket 7 made of a resin which has thin-walled part 7a in part as an example example 1 is used. like drawing 2 The position of vent hole 9a of the portion which a gasket 7 fractures when a pressure produces each vent hole inside an obturation object inside a cell, and the negative-electrode terminal assembly 9 is allotted to the maximum contiguity. It allotted the position which rotated vent hole 8a of a washer 8 located between them 180 degrees centering on the current collector 6 to vent hole 9a of the fracture portion of a gasket 7, and the negative-electrode terminal assembly 9. At the time of a rupture prevention mechanism operation, gas produced the assembly obturation object discharged out of a cell through the path shown by the dotted line, and used it for obturation of a cell. A washer 8 serves as a shelter, gas is bypassed and discharged and the electrolytic solution is separated from gas by the shelter.

[0014] The position of edge salient 8b and vent hole 9a of the negative-electrode terminal assembly 9 established in the position which faces centering on one vent hole 8a and a current collector 6 between the negative-electrode terminal assembly 9 which has the gasket 7 and one vent hole 9a which do not have a thin-walled part as an example 2, and these like drawing 3 at the washer 8 using the washer 8 which has one edge salient 8b toward a gasket 7 was allotted to the maximum contiguity. At the time of a rupture prevention mechanism operation, gas produced the assembly obturation object discharged out of a cell through the path shown by the dotted line, and used it for obturation of a cell. A washer 8 serves as an obstruction, gas is bypassed and discharged and the electrolytic solution is separated from gas by the shelter.

[0015] The assembly obturation object which allotted four physical relationship of vent hole 8a of the gasket 7 which cast annularly thin-walled part 7a fractured as an example of the example comparison of comparison when a pressure arises inside a cell to the shaft of a current collector 6, and the washer 8 located between them [of the negative-electrode terminal assembly 9 / four / vent hole 9a and between them] to the maximum contiguity like drawing 4 was produced. In this case, gas is discharged out of a cell through the linear path shown by the dotted line.

[0016] Thus, it connected so that one cell which was reverse-loaded with one of four pieces, respectively, and was reverse-loaded with the cell of this example and the example of comparison by three cells using 10-ohm external resistance might be charged, and the scattering state of the electrolytic solution at the time of generating gas and a rupture prevention mechanism operating inside a cell, was examined. The result is shown in (Table 1).

[0017]

[Table 1]

破裂防止機構作動時の電解液飛散試験結果

電解液の最大飛散距離	実施例 1	実施例 2	比較例
10 cm未満	58個	46個	0個
10 cm以上20 cm未満	23個	29個	17個
20 cm以上30 cm未満	19個	25個	32個
30 cm以上	0個	0個	51個
合 計	100個	100個	100個

[0018] The electrolytic solution in which an example disperses compared with the example of comparison at the time of a rupture prevention mechanism operation from the result of (Table 1) remains in the range with the narrow scattering range only near the cell.

[0019] in addition, the physical relationship this physical relationship is the most desirable and is [physical relationship] 90 degrees although the composition which rotated the gasket thin-walled part as a rupture prevention mechanism and the physical relationship between an edge salient and the vent hole of a washer 180 degrees centering on the charge collector explained in the example -- until -- the effect was accepted

[0020]

[Effect of the Invention] Even if gas will occur inside a cell by misuse etc. and a rupture prevention mechanism will operate if the shelter in a gas passage path is used for the rupture prevention mechanism of an alkaline battery like this invention as explained in full detail above, the product of the quality of an excellent article excellent in safety and reliability with doing little / there is little scattering of the electrolytic solution and] an injury to a human body or a device can be offered.

[Translation done.]

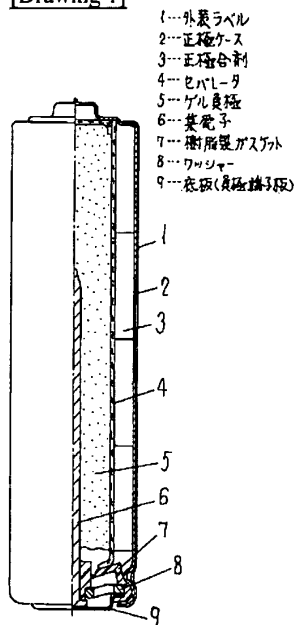
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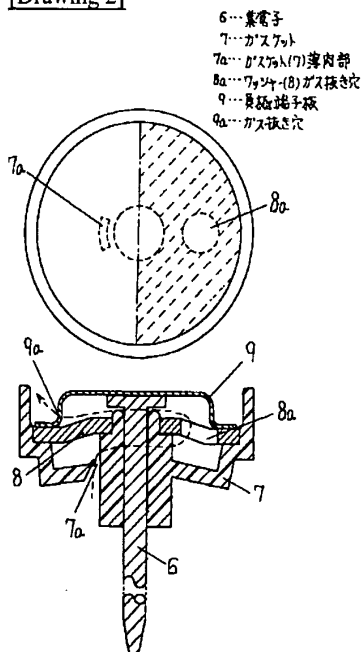
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DRAWINGS

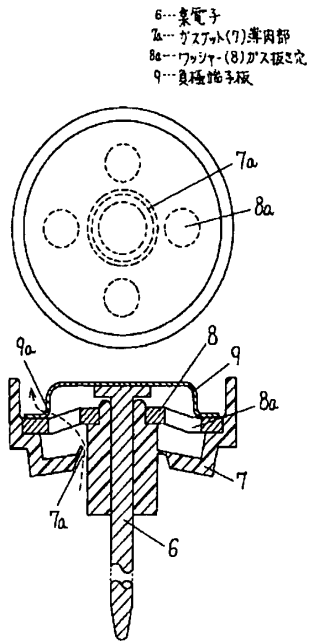
[Drawing 1]



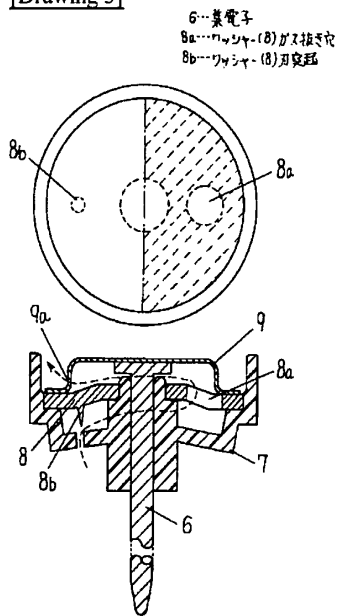
[Drawing 2]



[Drawing 4]



[Drawing 3]



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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The half-section view of an alkaline battery LR6 used for this invention

[Drawing 2] The cross section of the obturation object used for the example 1

[Drawing 3] The cross section of the obturation object used for the example 2

[Drawing 4] The cross section of the obturation object used for the example of comparison

[Description of Notations]

- 1 Sheathing Label
- 2 Positive-Electrode Case
- 3 Positive Electrode -- Mixture
- 4 Separator
- 5 Gel Negative Electrode
- 6 Current Collector
- 7 Gasket made of Resin
- 7a Thin-walled part
- 8 Washer
- 8a Vent hole
- 8b Edge salient
- 9 Bottom Plate (Negative-Electrode Terminal Assembly)
- 9a Vent hole

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CLAIMS

[Claim(s)]

[Claim 1] The alkaline battery which is an alkaline battery which obturated with the obturation object which consists of a washer which has a vent hole between the gaskets made of a resin and negative-electrode terminal assemblies which have a rupture prevention mechanism, and forms a thin-walled part in some gaskets made of a resin as a rupture prevention mechanism and by which the vent hole of the washer to this thin-walled part was formed in the semicircle which faces with a right-angled coaxial radius to the straight line which connects the medial axis of a cell to the aforementioned thin-walled part.

[Claim 2] The alkaline battery which was the alkaline battery which obturated with the obturation object which consists of a washer which has a vent hole between the gaskets made of a resin and the negative-electrode terminal assemblies which have a rupture prevention mechanism, faced the gasket made of a resin at some washers, formed an edge salient as a rupture prevention mechanism, and was formed in the semicircle which the vent hole of the washer to this edge salient faces with a right-angled coaxial radius to the straight line which connects the medial axis of a cell to the aforementioned edge salient.

[Claim 3] The alkaline battery according to claim 1 or 2 by which the vent hole of the washer to the vent hole prepared in the aforementioned negative-electrode terminal assembly was formed in the semicircle which faces with a right-angled coaxial radius to the straight line which connects the vent hole of the aforementioned negative-electrode terminal assembly, and the medial axis of a cell.

[Translation done.]